The Scholarly Enterprise in America

The Organization of Knowledge in Modern America, 1860–1920. ALEXANDRA OLESON and JOHN VOSS, Eds. Johns Hopkins University Press, Baltimore, 1979. xxiv, 480 pp. $22.95.

A few years ago the American Academy of Arts and Sciences decided to sponsor a wide-ranging historical study of the institutionalization of scholarship in America. The selection of an organizing principle for an investigation of the organization of knowledge in all of American history cannot have been easy. The approach chosen by the Academy's planners is familiar to observers of academic symposia, specialized conferences, and festschriften. Following the American historical profession's time-honored disdain for ideology and all-embracing analytical systems, the Academy assembled a group of distinguished scholars of the subject, allowing each one plenty of freedom to explore a facet of the topic in whatever way he or she chose. The strategy is remarkably like the policy Nathan Reingold attributes, in this collection, to the Carnegie Institution of Washington: fund the exceptional scholar in a familiar field (or, conversely, take no risks on the unproven investigator in a novel or controversial scholarly pursuit). The resulting publication is not an "overview" (a general survey, a summary) as the editors claim; it is, as they state correctly, selective, suggestive, and tentative.

The contributors adopt various familiar expository schemes, several of which could have been organizational models for the entire book. For example, there is John Higham's view that specialization in America, by expanding horizontally instead of vertically, followed a unique path toward democratic decentralization of institutional authority. This could have been an overarching hypothesis tested by all of the authors. Laurence Veysey's survey of "the plural organized world of the humanities" tends to validate Higham's hypothesis; Veysey believes that "centrifugal forces" had won a victory by 1920, achieving "an uneasy balance between centralism and decentralism inside particular fields" (p. 68). A. Hunter Dupree would probably agree with Higham, too. The National Academy of Sciences, which Dupree examines, was a prime candidate for a central, authoritarian role but failed as a community, as a polity, and as a mobilizer of resources; it did, however, remain "a repository of the values of the scientific community" (p. 345). On the other side, Edward Shils's emphasis upon the ascendancy of the university "and specific universities within that newly dominant class" of institutions of knowledge suggests more undemocratic centralization than Higham's thesis implies. In the work of almost every other participating scholar, there is evidence bearing on Higham's main conclusion.

The book (the second part of the American Academy's three-part project) also contains numerous middle- and lower-range hypotheses that might have been selected to synthesize the generally excellent essays. A striking example is Garland Allen's paper on T. H. Morgan and the transformation of biology, in which Morgan's work is tied to a conflict between the naturalist and experimentalist approaches, that is, between concern with structure and description followed by speculative conclusions and concern with function and hypotheses tested by quantitative evidence.

The scholars who planned this volume might also have decided simply to describe specific, highly visible institutions, disciplines, or issues, hoping the accumulation of evidence would lead inductively to conclusions that enhance our understanding of organizational processes. Several authors take this route. Margaret Rossiter discusses the agricultural sciences and their supporting institutions, highlighting their dependence upon federal funding. Daniel Kevles describes the physics, chemistry, and mathematics communities and discovers, among other things, regional rivalries within disciplines. Dorothy Ross investigates specialization in the social sciences and points to the absence of a common identity as "social scientists" until after the First World War. Geology and certain biological sciences receive no concentrated attention, though geology was a major American science in the late 19th century and the years covered in the volume are the first six decades of Darwinism. Some papers focus on a single institution. The Carnegie Institution of Washington and the Boston Society of Natural History are each given a chapter. The Smithsonian Institution is barely mentioned, and the American Academy of Arts and Sciences is almost invisible in the very pages it commissioned. Important issues are not forgotten in the book. Hugh Hawkins's study of stresses between the research and instructional functions of the university is an especially illuminating example of how the ground might have been covered by encouraging each author to concentrate on a single, significant issue that cuts across disciplinary boundaries.

Another possible way to achieve organizational coherence would have been the deliberate selection and consistent employment of a social science theory or methodology. The one sociologist among the contributors avoids theoretical questions. Historian Charles Rosenberg, whose vocabulary and citations reveal a working knowledge of social science theory, warns against too facile an acceptance of theoretical constructs. Rosenberg also cautions against exclusive reliance on "neat labels such as specialization and professionalization" that "tend to incorporate a largely unexamined model of uniform institutional development" (p. 441). He also wags a finger at scholars who see professionalization only in terms of the creation of societies, the foundation of journals, the imposition of licensing standards, and similar elements in an evolutionary pattern.

Although the strategy selected by the Academy results in methodological and empirical discontinuities, it does permit the examination of problems that go beyond organizational structures and the processes and motivations creating them. Most of the time, the authors fail to seize the opportunity. For example, they appear to believe that the central purpose of an institution of knowledge—university, society, foundation, profession, discipline, or whatever—is to increase and diffuse knowledge, in Smithson's phrase—but they do not ask whether all knowledge should be increased, or whether some types of knowledge deserve more encouragement than others. For the achievement of what ends should knowledge be increased? To expand human cooperation? To increase profits? To manipulate people? To conduct war more efficiently?

Some important analytical questions are also ignored. How did organizational forms affect the quality of the finished work? What criteria should historians employ to weigh the intellectual significance of completed research? Did the changing social organization of knowledge affect the way people perceived and organized their ideas and investigative techniques? What were the relationships between scientific concepts and methods and the structure of the institutions housing them? Allen's essay is the only paper that confronts the last question squarely.

The history of the organization of knowledge in America may be too young to concern itself with large normative issues or to touch every inch of the territory. Internal evidence suggests as much. Components of a pattern for the institutional development of scholarship can be selected arbitrarily from several papers in the volume (with apologies to Rosenberg) to help us find where these historians of the subject are now. First, the contributors have passed the professional entrance requirement: they all appear to have the Ph.D. Nearly every one is connected to a university, most come to the subject from a broader discipline, and the group can be called an elite, though not one that tries to remove its scholarship (in Higham's words) "from common understanding and participation." The research and writing were sponsored by an honorific organization, a practice that was atypical during the 19th century. But by and large the research style chosen by the authors places them in Allen's "naturalist" tradition. Mainly, the essays are descriptive, factual, inductive, speculative. There is a reluctance to formulate hypotheses and then examine them systematically with quantitative evidence. The form of Dupree's paper is nearest to the "experimentalist" approach: he classifies functions of the National Academy and then methodically introduces evidence, including numerical data, to test how the organization performed in each category. Kevles also counts and compiles, but quantification is rare in the book. Finally, our specialists do not have a learned society of their own yet, or a society-controlled journal, though *Minerva* serves the latter's purpose.

In sum, the history of the organization of knowledge seems to be about where emerging specializations were just prior to 1920. One should not expect a youthful sub-subdiscipline to address every related moral question nagging society today, or to exhibit perfect theoretical symmetry during its pioneering years. At this stage such coherence and moral legitimacy are rather like what Veysey, writing about the annual meetings of the American Philosophical Association in earlier days, refers to as "the elusive promise . . . that they might actually bring about agreement on the nature of ultimate truth through deliberation by a committee" (p. 79).

MORGAN SHERWOOD
Department of History,
University of California,
Davis 95616

Magnetic Effects

Cosmical Magnetic Fields. Their Origin and Their Activity. E. N. PARKER. Clarendon (Oxford University Press), New York, 1979. xviii, 842 pp., illus. $95. International Series of Monographs on Physics.

Parker is the outstanding authority on the theory of the sun's magnetic field. In 1955 he published a crucial insight concerning the way in which the solar field is generated by a turbulent dynamo, and he has been contributing at a consistently high level ever since. Hence it is of great interest when he takes pen in hand to summarize his work. The resulting book, *Cosmical Magnetic Fields*, is a major contribution to the astrophysical literature.

Parker has a very definite point of view: he argues that except possibly for a small set of highly symmetric magnetic topologies it is impossible to permanently bind magnetic flux into stars. Thus, the magnetic fields we do observe in the sun, stars, and galaxies are ephemeral and require continual regeneration by some process. A key point is that a flux tube bearing stellar or galactic gas is lighter than its surroundings and is thus buoyed upward, ultimately to escape. Parker argues this point in the book by exploring many examples of possible equilibrium in detail.

If the field is to be regenerated, Parker argues that some type of dynamo must be at work, with differential rotation stretching meridional fields into azimuthal ones, and cyclonic turbulence twisting azimuthal fields back into meridional ones. Since the turbulence in most stars is due to thermal convection on a small scale, the newly generated meridional fields are small-scale, so that reconnection of the lines of force is necessary to regenerate the original large-scale fields. Parker explains dynamo theory and reconnection in precise mathematical detail.

I like Parker's style on the whole. Each chapter begins with a pictorial discussion of the physical problem and continues with several relevant physical models worked out mathematically; there is then a summary of the general conclusions that can be drawn from these examples.

The book is based on the equations of magnetohydrodynamics, so that many of the specifically plasma effects in cosmic magnetic fields, such as high-frequency oscillations and instabilities, are largely ignored. There is brief reference to ion-acoustic instabilities, plasma turbulence, and anomalous resistivity in relation to the necessity of rapid reconnection of lines of force in dynamo theory.

I have one complaint. At times the writing is repetitive, and at times more examples are considered than are necessary to make the point. The result is that the book is considerably longer and more expensive than it needs to be. But that is a cavil: Parker has written a book that will dominate the field. None of the other books on the subject, such as Moffatt's *Magnetic Field Generation in Electrically Conducting Fluids* (Cambridge University Press, 1978) and Cowling's *Magnetohydrodynamics* (Adam Hilger, 1976) is as deep and as comprehensive.

GEORGE B. FIELD
Center for Astrophysics,
Harvard University,
Cambridge, Massachusetts 02138

Reproductive Adaptations

Reproductive Ecology of Marine Invertebrates. Papers from a symposium, Georgetown, S.C., May 1977. STEPHEN E. STANCYK, Ed. Published for the Belle W. Baruch Institute for Marine Biology and Coastal Research by University of South Carolina Press, Columbia, 1979. xxii, 284 pp., illus. $27.50. Belle W. Baruch Library in Marine Science, No. 9.

This book presents the proceedings of a very successful symposium that was dedicated to A. Giese of Stanford University, who has done pioneering work on the reproductive biology of marine invertebrates and has inspired many others to follow. The book is organized into four sections comprising 19 papers including original research reports as well as review articles. The four sections are: Egg Size and Nutrition; Recruitment, Survival and Distribution; Environmental Effects on Reproduction; and Reproductive Patterns in the Marine Environment. The book concludes with a brief but comprehensive summary by the editor.

In general the book is a useful documentation of current thought on its topic;